

Appl. No. 10/757,366
Amdt. Dated March 6, 2006
Reply to Office Action of October 6, 2005

Attorney Docket No. 89171.0004
Customer No. 26021

REMARKS:

Election/Restrictions

Claims 1-22 are pending in the application. The Examiner has required the restriction of further prosecution to one of the following inventions: an integrated electro-optical circuit, claims 1-13 (Group I); or a method of manufacturing an integrated electro-optical circuit, claims 14-22 (Group II). In response, Applicant hereby affirms the election of Species A of Group I, corresponding to claims 1-5 and 9-13, without traverse. Claims 1-5 and 9-13 are presented for further prosecution.

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Drawings

The drawings filed on January 13, 2004 have been objected to by the Examiner for lack of clarity in places not identified by the Examiner. New drawings in compliance with 37 CFR 1.121(d) are hereby submitted with this response.

Claim Rejections – 35 USC § 103

Claims 1-5, 9, 10, and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over the Yamamoto et al patent (US 6,078,707) in view of the Lange et al reference (“High Gain Short Length Phosphate Glass Erbium-Doped Fiber Amplified Material” NPL). This rejection is respectfully traversed.

Independent claim 1 requires an integrated electric-optic circuit comprising a semiconductor substrate composed of a material suitable for use as a detector of a predetermined signal wavelength and an electronic circuit layer positioned on the substrate. The circuit also includes a buffer layer positioned on the circuit layer and a waveguide layer positioned on the buffer layer, wherein the waveguide layer is formed of phosphate glass doped with an amplifying material. The circuit also includes a cladding layer positioned on the waveguide layer, wherein an index of refraction of the waveguide layer is greater than an index of refraction of the buffer layer, and greater than an index of refraction of the cladding layer.

The Examiner concedes that neither of the cited references, when considered alone, teaches the claimed circuit, but relies on their combination for teaching the same. Specifically, the Examiner states that Yamamoto et al teaches all elements of claim 1, except for the phosphate glass waveguide layer doped with an amplifying material. The Lange et al reference teaches using Er and Yb to dope a phosphate glass waveguide.

The Examiner states that it is obvious to combine the doped phosphate glass waveguide of the Lange et al reference with the circuit of the Yamamoto et al patent to arrive at the claimed invention. The Examiner states that the motivation to combine the references is that the Lange et al reference states that Er-Yb doped waveguides have a significant capacity for large gain per length coefficients which

leads to the ability to achieve large gain in compact devices. Applicant respectfully disagrees that there is motivation to combine the references.

The suggestion to make the claimed combination must be found in the nature of the problem to be solved, the teachings of the prior art, or the knowledge of persons of ordinary skill in the art. MPEP § 2143.01. The proper inquiry is "whether there is something in the prior art as a whole to suggest the *desirability*, and thus the obviousness, of making the combination." *In re Fulton*, 391 F.3d 1195, 1200-01 (Fed. Cir. 2004). It is respectfully submitted that nothing in either the Yamamoto et al patent or the Lange et al reference suggests the electro-optical circuit of claim 1.

The references do not suggest the desirability of using Er-Yb doped phosphate glass in the waveguide layer of the electro-optic circuit of Yamamoto et al. The principal advantage of using Er-Yb doped phosphate glass is the material's ability to amplify a signal over very short lengths. Nothing in the Yamamoto et al. reference discusses the desirability of having signal amplification in the waveguide layer by using a doped glass waveguide layer. In fact, the Yamamoto et al patent teaches away from using Er-Yb doped phosphate glass, describing the use of glass doped with metal ions (Er and Yb are metals) as undesirable (at column 8, lines 28-40):

"Accordingly, when the waveguide layer is formed of a glass material including metal ions...the metal ions reaching the impurity diffused region through the SiO₂ layer *may exert an adverse influence* as described above....[S]ince the metal ions in some glass materials have an adverse influence, glass materials which are usable for a waveguide-photodetector are limited."
(Emphasis added.)

The reference then goes on to teach methods of reducing propagation loss in the waveguide layer through various formation methods.

Therefore, Applicant respectfully submits that the suggestion for the combination of the two references proposed by the Examiner comes only from the claimed invention itself. One of ordinary skill in the art would not have found it obvious to select the distinct elements and concepts from the Yamamoto et al patent and the Lange et al reference so as to arrive at the claimed invention without using the present claims as a guide. Thus, it is respectfully submitted that one of ordinary skill in the art, working without the benefit of the Applicant's specification, would have had no motivation to combine the features of the cited references to arrive at the present claims 1-5, 9, 10, and 12.

Claims 4 and 5 are rejected under 35 U.S.C. 103(a) as being unpatentable over the Yamamoto et al. patent in view of the Lange et al reference. The rejections of Claim 4 and 5 are improper because neither reference teaches the claimed limitation of a light signal tap for directing the coupling signal towards the sensor. To establish a *prima facie* case of obviousness, the references must teach or suggest all the claim limitations. MPEP § 2143. The Examiner states that the Yamamoto et al. reference teaches this limitation in column 19, lines 1-62. Applicant respectfully disagrees.

Nowhere in the cited passage, or anywhere else in the reference, does Yamamoto teach a light signal tap for directing the coupling signal towards the sensor. The Examiner states that Yamamoto et al teaches a tap (per Applicant's claim 4) which includes a region of the buffer layer that has an increased index of refraction with respect to the index of refraction of the buffer layer, as claimed in claim 5. However, the Yamamoto et al. reference only teaches a buffer layer formed

of a dielectric material having the property of allowing the light propagated through the waveguide layer to transmit therethrough. Nothing in the reference describes a region of relatively higher index of refraction *within the buffer layer*. The dielectric layer has a refractive index smaller than that of the waveguide layer (see column 19, lines 15-25).

The Yamamoto et al reference teaches a "coupling section" for propagating the light to the opto-electric converting section (see column 14, lines 6-15), but this coupling section is not a light signal tap. The light signal tap redirects a *portion or sample* of an optical signal that is propagating through the buried channel waveguide in the waveguide layer towards a photosensor imprinted in the electronic integrated circuit layer (Applicant's specification, paragraph 0025). The coupling section in the Yamamoto et al reference is defined as a section for coupling the light to the opto-electric converting section (see col. 13, lines 52-60). The Yamamoto et al reference teaches a coupling section without propagation loss and, in certain embodiments, has 100% photocoupling efficiency (see col. 14, lines 36-45; col. 18, lines 15-20). This is different from Applicant's claimed light signal tap, which samples the signal. Thus, Yamamoto et al does not teach the claimed limitation of a light signal tap for directing the coupling signal towards the sensor.

Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over Yamamoto et al in view of Lange et al as applied to claims 1-5, 9, 10, and 12, and further in view of the Han et al patent. Claim 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over the Yamamoto et al patent in view of the Lange et al reference as applied to claims 1-5, 9, 10, and 12, and further in view of the Harchanko et al. patent. For the reasons stated above, there is no suggestion in the references to combine the Yamamoto et al. patent and the Lange et al. reference.

Thus, the Yamamoto et al patent and Lange et al reference do not teach or suggest claims 1-5, 9, 10, and 12. Claims 11 and 13 depend directly from patentable claim 1, and are, therefore, believed to be patentable for at least the same reasons as that claim.

Moreover, the Han et al patent, entitled Laser Chemical Fabrication of Nanostructures is not analogous prior art and therefore should not be relied upon as a basis for rejecting Applicant's invention. The Han et al. reference is not in the field of electro-optic devices and is not reasonably pertinent to the issues with which Applicant is concerned.

Furthermore, the rejection of claim 11 should be withdrawn, as the Examiner does not properly support the proposition that it is well known and routine to use AlGaAs substrates in opto-electronic devices. While the Han et al patent teaches that AlGaAs substrates are known to those skilled in the art of luminescent porous materials (see paragraph 15), the patent states nothing about whether it is well-known that AlGaAs substrates are suitable for use in electro-optic devices given the particular issues associated with such devices. In addition, assertions of technical facts in areas of esoteric technology should be supported by citation to some reference work recognized as standard in the pertinent art. *In re Alhert*, 424 F.2d 1088, 1091 (CCPA 1970).

Thus, there is no suggestion or motivation to combine the Han et al reference with the Yamamoto et al. patent and the Lange et al. reference, and the rejection of claim 11 should be withdrawn.

In view of the foregoing, it is respectfully submitted that the application is in condition for allowance. Reexamination and reconsideration of the application, as amended, are requested.

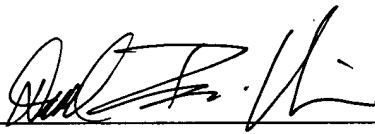
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If for any reason the Examiner finds the application other than in condition for allowance, the Examiner is requested to call the undersigned attorney at the Los Angeles, California telephone number (310) 785-4600 to discuss the steps necessary for placing the application in condition for allowance.

Respectfully submitted,
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